REMARKS

Claims 1-2, 7-21, and 42-45 are currently pending. Claim 9 has been amended.

Objections to the Specification

The Examiner objected to the specification for failing to identify a trademark. By way of this response, the specification is amended at page 11, line 21 to properly demarcate "TWEEN 20" as a trademark. Applicant submits that in light of the amendment the specification is in compliance with all legal requirements.

Claim Objections

Claim 9 has been amended to address the informalities identified by the Examiner.

Claim Rejections

Claim Rejections under 35 U.S.C. § 102(b)

The Examiner rejected claims 1-2, 7-9, and 19-20 under 35 U.S.C. § 102(b) as being anticipated by Kretz (U.S. Patent No. 6,110,719). Applicant respectfully traverses.

Under 35 U.S.C. § 102(b), "[a] claim is anticipated *only* if *each and every* element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference" *Verdegal Bros. v. Union Oil Co. of California,* 814 F.2d 628, 631 (Fed. Cir. 1987) emphasis added.

Claim 1 is directed to a composition comprising:

a) a buffer

b) an organic anion of formula I (wherein the currently elected embodiment is phytate)

where the organic anion is effective to substantially decrease ring formation upon drying of a spot less than or equal to about 300 μm.

The Examiner contends that Kretz discloses the claimed composition at col. 3, lines 32-40. Since Kretz does not disclose that the phytate is effective to decrease spot size as required by claim 1, it appears that the Examiner bases the rejection on the conclusion that the spot reducing capability of the Kretz phytate is inherent. Applicant respectfully disagrees.

Section 2112 of the MPEP sets out the standard for rejections based on inherency. As outlined, "In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art" *ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & inter. 1990).

Applicant submits that the phytate disclosed by Kretz does not necessarily possess the characteristic of being effective to reduce spot size. In fact, it is likely that the Kretz buffer would not be capable of reducing spot size.

Kretz describes in great detail that phytate is a substrate for phytase (see generally background section). Phytase enzymes catalyze hydrolysis of phytate to inositol and inorganic phosphate (col. 1, lines 50-53). The buffer disclosed by Kretz contains both phytate and phytase. As such, the phytate is subject hydrolysis by phytase and so is not intact. It is likely that this hydrolysis affects the ability of phytate to reduce spot size. Thus, this characteristic cannot be properly classified as inherent in the disclosure of Kretz since the Kretz phytate does not necessarily possess the ability to reduce spot size.

Based on at least the reasoning outlined above, Applicant submits that Kretz does not anticipate claim 1 or any claim depending therefrom. Applicant respectfully requests that the rejection be withdrawn.

Claim Rejections under 35 U.S.C. § 103(a)

Claims 1-2 and 7-21: Kreft et al. and Veraart et al.

The Examiner rejected claims 1-2 and 7-21 under 35 U.S.C. § 103(a) as being unpatentable over Kreft et al. and Veraart et al. Applicant respectfully traverses.

To establish *prima facie* obviousness, three basic criteria must be met. "First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Third, the prior art reference (or references when combined) must teach or suggest all the claim limitations." (See MPEP 2142).

The Examiner contends that Kreft et al. disclose nucleic acid hybridization compositions comprising nucleic acids, anionic surfactant SDS, inorganic phosphate and sodium phosphate. The Examiner further contends that Veraart et al. disclose the use of phytic acid with a pH buffer comprising inorganic phosphate and that Veraart et al. teach that phytic acid is a large, polyionic molecule whose ionic strength is relatively large as compared with its concentration.

The Examiner concludes that it would have been obvious to one of ordinary skill in the art to modify the hybridization buffer of Kreft et al. with the phytic acid of Veraart et al. since phytic acid has a relatively large ionic strength as compared with its concentration. Applicant respectfully disagrees.

At the outset, it is important to note that immobilization of molecules on array surfaces does not occur through specific hybridization. Rather, immobilization occurs through functional groups provided on the surface. Furthermore, the functional groups are provided in a uniform fashion across the surface. Therefore, the spots are not achieved as a function of providing functional groups in only limited areas of the surface. Rather, spots are achieved as a result of the natural shape of a drop of liquid. The molecule to be immobilized is introduced to the surface in the form of a drop of liquid buffer, which is, of course, round in shape. The molecule then attaches to the surface via

functional groups on the substrate immediately below the drop. Thus, the molecules to be immobilized are bounded within the drop of liquid giving the characteristic spotted appearance.

Veraart et al. teach the use of phytic acid to prevent an analyte protein from attaching to capillary walls as a means to improve peak distortion. The present invention, on the other hand, is concerned with attaching a molecule to a substrate and not to the prevention of such an attachment. Specifically, the present invention can include preventing the migration of a molecule within a spot of buffer applied to a substrate. As detailed in the specification at page 14, lines 10-20, poor spot morphology appears to result from migration of molecules to outer perimeters of spots of print buffer. There is no teaching or suggestion in Veraart et al. that phytic acid can prevent such migration, which proceeds by a mechanism distinct and unrelated to non-specific absorption.

Veraart et al. is directed to the solution of a distinct problem, namely non-specific binding of proteins to capillary walls. There is no logical connection between the prevention of this non-specific binding and the instant problem of poor spot morphology on array supports, since already established, poor spot morphology is not the result of non -specific binding. Therefore, one of ordinary skill in the art would not be motivated to combine the teachings of Kreft et al. and Veraart et al. when attempting to solve the problem of poor spot morphology.

Further, for the reasons outlined directly above, there is no reasonable expectation of success in combining Kreft et al. and Veraart et al. There is no teaching or suggestion that properties of phytic acid described in Veraart et al. and cited by the Examiner would be effective in producing improved spot morphology on a substrate. There is no connection between prevention of non-specific absorption and improved spot morphology. Thus, in combining Kreft and Veraart et al., there would be no reasonable expectation of successfully producing improved spot morphology.

The Examiner concludes that since the Veraart et al. method results in increased specific hybridization signal to noise ratio the method would be useful in hybridizations assays. Such a statement is overly broad. Although the presently claimed buffer is

related to hybridization studies, it is not directed to the prevention of non-specific hybridization. Veraart et al. teach the use of phytic acid to reduce non-specific hybridization of protein to capillary walls. This is not particularly pertinent to problem of spot morphology. Therefore, one skilled in the art attempting solve the problem of array spot morphology would not look to Veraart et al. "In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of endeavor or, if not, then be reasonably pertinent to the particular problem with which the invention is concerned." In re Oetiker, 977 F.2d 1443, 1446 (Fed Cir. 1992).

Finally, the Examiner concludes that the effectiveness of phytate in reducing ring formation upon drying in Veraart et al. is inherent. Applicant submits that this conclusion is moot in light of the fact that (1) there is no motivation to combine the references, (2) there is no reasonable expectation of success, and (3) it is impermissible to rely on Veraart et al. as a basis for rejection because the reference is non-analogous art.

For at least the reasons outlined above, Applicant submits that claim 1 and all claims that depend therefrom are not obvious in light of the combination of Kreft et al. and Veraart et al. Applicant respectfully requests that the rejection be withdrawn.

Claims 1 and 14-15: Kretz in view of Sambrook et al.

The Examiner rejected claims 1 and 14-15 under 35 U.S.C. § 103(a) as being unpatentable over Kretz and Sambrook et al. Applicant respectfully traverses.

The Examiner concludes that there is motivation to combine Kretz and Sambrook et al. because phosphate buffer would enhance the buffering capacity of phytic acid. This reasoning is flawed. The only purpose for the phytate in the Kretz buffer is to serve as a substrate for measuring the activity of the phytase enzyme. There is no teaching or suggestion in Kretz to implement phytic acid for any purpose other than to serve as a substrate in an enzyme assay. Namely, Kretz does not suggest the use of phytate as a buffering agent or buffer additive. One skilled in the art preparing an array buffer would not be interested in supplementing the buffer with a substrate for an enzyme. Therefore, there is no suggestion or motivation to combine with this reference with Sambrook et al.

or any other reference related to buffer systems, let alone buffer systems for use in hybridization array production. Likewise, there is no reasonable expectation of successfully reducing spot size by combining the teachings of Kretz and Sambrook et al.

Furthermore, the combined teaching of Kretz and Sambrook et al. fail to disclose each and every element of the claims. Claim 1 includes a limitation to the organic anion's ability to substantially decrease ring formation upon drying of a spot less than or equal to about 300 μm. The Examiner did not address this limitation.

As already detailed above with respect to the 102(b) rejection, the phytic acid of Kretz cannot be properly assumed to possess the ability to reduce spot size. The phytic acid in Kretz is provided as a substrate for phytase. Thus, in the buffer the phytic acid is not intact due to hydrolysis by phytase. Therefore, the phytic acid cannot be properly considered to possess the ability to reduce spot size.

Finally, the Kretz reference is not proper prior art. "In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of endeavor or, if not, then be reasonably pertinent to the particular problem with which the invention is concerned." In re Oetiker, 977 F.2d 1443, 1446 (Fed Cir. 1992).

Kretz is directed to a purified phytate enzyme derived from *E. coli*. In particular, Kretz describes the usefulness of this enzyme as an additive for animal feed. In stark contrast, the present invention is directed to print array buffers for improving spot morphology. As already described, Kretz's use of phytate is merely as a substrate for an enzyme assay. There is no teaching or suggestion that phytate has properties useful as a buffer additive or buffering agent. Likewise, there is no mention of array technology let alone the use of phytate to prepare a buffer that produces reduced spot size.

The field that Kretz is related to (enzymes and nutrition) is quite distinct and unrelated to the field of the present invention. In fact, Kretz would not have commended the attention of a person involved in the field of drug delivery coatings. (See MPEP 2141.01(a) citing Wang Laboratories Inc. v. Toshiba Corp., 993 F.2d 858 (Fed. Cir. 1993)).

Therefore, for at least the reasons outlined above, Applicant submits that the claims are not obvious in light of the combination of Kretz and Sambrook et al.

Claims 42-45: Diehl et al. and Veraart et al.

The Examiner rejected claims 42-45 under 35 U.S.C. § 103(a) as being unpatentable over the combination of Diehl et al. and Veraart et al. Applicant respectfully traverses.

The combination of Diehl et al. and Veraart et al. do not teach or suggest the use of phytate to produce arrays with reduced spot size. Diehl et al. teach a method of producing DNA microarrays. However, Diehl et al. do not cure the deficiencies of Veraart et al. outlined above.

The Examiner concludes that "[a]n artisan would be motivated to include phytic acid in a method of spotting organic compositions such as nucleic acids because phytic acid has a relatively large ionic strength as compared with its concentration. . . and the art recognizes that increasing ionic strength can reduce non-specific absorption on a support". As already described in detail, solutions directed to reducing non-specific absorption do not bear on the problem of reducing spot size. In fact, hybridization is not the technique used to immobilize probe molecules on substrate surfaces. Therefore, an artisan reading Veraart et al. would not conclude that there might be a benefit derived from the addition of phytic acid to an array spotting buffer.

For at least the reasons outlined with respect to the 103(a) rejection of claims 1-2 and 7-21, and those above, Applicant submits that the claims are not obvious in light of the combination and Diehl et al. and Veraart et al.

Claims 42 and 45: Diehl et al., Veraart et al. and Lemieux et al.

The Examiner rejected claims 42 and 45 under 35 U.S.C. § 103(a) as unpatentable over Diehl et al., Veraart et al. and Lemieux et al. Applicant respectfully traverses.

Lemieux et al. teach pin piezoelectric spotting. However, Lemieux does not cure the deficiencies of Diehl et al. and Veraart et al. outlined above. Therefore, the claims are not obvious in light of the combination of Diehl et al., Veraart et al. and Lemieux et al.

In view of the foregoing, it is submitted that each of claims 1-2, 7-21, and 42-45 are in condition for allowance. Favorable consideration and prompt allowance of the application are respectfully requested.

If the Examiner feels that prosecution of the present application can be materially advanced by a telephonic interview, the undersigned would welcome a call at the number listed below.

Respectfully submitted,

MERCHANT & GOULD P.C.
P.O. Box 2903
Minneapolis, Minnesota 55402-0903
612.332.5300

Date: March 26 2007

Mark T. Skoog
Reg. No. 40,178
MSkoog:jm:kf